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AN ECOLOGICALLY ANNOTATED LIST OF THE PHALAENIDAE OF MONTANA (LEPID.)*

BY WILLIAM C. COOK,

Bozeman, Montana.

(Continued from page 277)

- 1999 *C. florea* Guen. Two specimens from Malta in July.
2001 *C. omissa* Dod. One specimen from Hamilton, July 11, 1928.
2004 *C. similaris* Sm. Scattered specimens from all parts of the state except the southern Plains region. July-August. Rather common at Malta in 1928. It is quite probable that some of these records refer to *montanae*.

Nycterophaeta Sm.

- 2008 *N. luna* Morr. A few scattered specimens from the northern Plains and Intermountain regions. July-August.

Oncocnemis Led.

- 2016 *O. dayi* Grt. One specimen, Havre, Aug. 26, 1922.
2019 *O. regina* Sm. One specimen from Three Forks and one from Malta in September.
2022 *O. albifasciata* Hamp. Single specimens from Havre, Glasgow and Hamilton in September.
2031 *O. sanina* Sm. Two specimens from Bozeman in June and July.
2032 *O. simplex* Sm. Intermountain and northern Plains regions. August-September. Common. Series of this species from the same place in a single season are very uniform, but there is quite a difference between localities and in different seasons. It comes very freely to light.
2038 *O. occata* Grt. Scattered specimens from all parts of the State except the southern Plains region. June-August.
2043 *O. augustus* Harv. Statewide in distribution. Fairly common in the northern Plains region, rare elsewhere. September-October.
2048 *O. cibalis* Grt. Intermountain and northern Plains regions. August-September. Rare.
2060 *O. umbrifascia* Sm. One specimen from Three Forks July 27, 1927 and one from Hamilton, Aug. 12, 1928.
2062 *O. barnesi* Sm. One specimen, collected at Butte Aug. 28, 1900 by R. A. Cooley, is in the Smith collection. One specimen from Bozeman, Aug. 29, 1929.
2063 *O. figurata* Harv. Apparently statewide in distribution but very rare everywhere. June-July.
2064 *O. major* Grt. One specimen from Hamilton June 23, 1925 and one from Bozeman, July 23, 1928.
2069 *O. chandleri* Grt. Intermountain and Pacific slope regions. June-September. Rare.

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2070 *O. colorado* Sm. One specimen collected at Malta Aug. 18, 1928, was doubtfully referred to this species by McDunnough.

2070,1 *O. mackiei* B. & B. Plains regions. July-September. Quite rare. McDunnough thinks this may possibly be a northern form of *colorado* Sm.

Adita Grt.

1504 *A. chionanthi* A. & S. Plains region. August-September. Rare.

Apharetra Grt.

1517 *A. pyralis* Sm., One specimen from Hamilton, July 30, 1928.

Cerapoda Sm.

2077 *C. oblita* Grt. One specimen from Three Forks Sept. 10, 1925 and one from Bozeman, Sept. 13, 1929.

2078 *C. stylata* Sm. Three specimens from Malta and one from Miles City. June-July.

Homohadena Grt.

2081a *H. infixa dinalda* Sm. Two specimens from Hamilton and one from Bozeman in July.

2087 *H. stabilis* Sm. Statewide in distribution, not very common anywhere. July.

Pseudanarta Grt.

The species of this genus come to light very freely and occasionally quite large flights have been taken in portable light trap at Three Forks. *Caeca* is by far the most common and *flava* much more rare, while only occasional specimens of *crocea* are captured. A group of larvae closely resembling small *Polias* were collected under sage brush in May. The head was small and the body gradually widened posteriorly, somewhat resembling the larvae of Syrphid flies, although the tapering was not so exaggerated. They were about the size of a half grown *Euxoa* larva but were apparently full grown, as they fed no more. They remained in a dormant condition until after the first of August at which time they pupated. The moths emerged late in the same month. They were not discovered for some time after emergence and were too worn for specific identification but were probably *caeca*.

2088 *P. flava* Grt. Intermountain and Pacific slope regions. August-September. Rare.

2089 *P. crocea* Hy. Edw. Great Plains and Intermountain regions. August-September. Rare.

2091 *P. caeca* Dod. Intermountain and Pacific slope regions. August-September. Rare. Fairly common in the country around Three Forks.

Epidemas Sm.

2114 *E. cinerea* Sm. Three specimens from Bozeman in September 1927. McDunnough reported, "I have a suspicion that there is only one variable species in this genus to which, of course, the name *cinerea* should apply."

Bombycia Steph.

2119 *B. elda* French. One specimen from Hamilton, Sept. 21, 1927.

Brachylomia Hamp.

2112 *B. populi* Stkr. Intermountain and Pacific slope regions. June, August-September. Common. Two generations of this species may occur.

Litholomia Grt.

2124 *L. napaea* Morr. Intermountain and Pacific slope regions. Common. This species hibernates as an adult and specimens have been secured from September until May.

Graptolitha Hbn.

2136 *G. disposita* Morr. Statewide in distribution. Fairly rare everywhere, but apparently most common in the northern Plains. September-October. It is probable that this species hibernates as an adult although we have no early spring records of capture.

2141 *G. amanda* Sm. Intermountain and Pacific slope regions. May. Rare.

2155 *G. georgii* Grt. Occurs everywhere except in southern Plains region. Very common in the Pacific slope area, where it is probably the most common green fruit-worm. Hibernates as an adult and comes quite freely to light in the early spring. The spring flight may be used as an indicator of possible green fruit-worm injury. In 1920 a flight of 51 moths in 49 collections at Hamilton preceded a summer in which there was about 10% green fruit-worm damage to apples in the Bitter Root Valley. It seems probable that *G. torrida* Sm. was also involved in this outbreak.

2156 *G. fagina* Morr. Intermountain and Pacific slope regions. October-May. Rare.

2157 *G. itata* Sm. One specimen from Bozeman Oct. 26, 1927 and one from Hamilton April 17, 1929.

2161 *G. torrida* Sm. Pacific slope region. Fairly common at Hamilton in certain seasons. April-May. We have no fall records of this species.

2163 *G. pexata* Grt. Two specimens from Hamilton May 1 and 24, 1929.

2166 *G. atara* Sm. One specimen from Hamilton Oct. 15, 1928.

Xylena Ochs.

2169 *X. nupera* Lint. Scattered specimens from all parts of the State. September-June. Fairly common in the Intermountain and Pacific slope regions.

2170 *X. mertena* Sm. Fairly common in Intermountain and Pacific slope regions. May-June. These records may not be entirely accurate as for several years this was not separated from the following.

2173 *X. cineritia* Grt. Intermountain and Pacific slope regions. September-May. Rare.

Eurotype Hamp.

2178 *E. anceps* Steph. (*confragosa* Morr.) One specimen from Bozeman, Sept. 18, 1928.

Pleroma Sm.

2182 *P. conserta* Grt. Two specimens from Bozeman May 15 and 19, 1928.

2184 *P. obliquata* Sm. Intermountain and Pacific slope regions. April-May. Rare.

2185 *P. cinerea* Sm. Three specimens from Bozeman in May and June 1928. Two from Hamilton in Sept. 1927. These records indicate possible hibernation in the adult stage.

Eumichtis Hbn.

2188 *E. versuta* Sm. Intermountain and Pacific slope regions. June-July. Rare.

2190 *E. loda* Stkr. Intermountain and Pacific slope regions. August-September. Rare.

Fishia Grt.

1525 *F. (Anytus) cvelina* French. Statewide in distribution, rare everywhere. September-October.

1531 *F. (Anytus) exhilarata* Sm. One specimen from Havre in September 1922.

1532 *F. (Anytus) betsia* Sm. Probably statewide in distribution. Rare, everywhere. September-October.

2192 *F. (Anytus) connectus* Sm. One specimen from the Three Forks country, picked up as a pupa in August 1925. Emerged September 13.

Conistra Hbn.

2212 *C. tristigmata* Grt. Two specimens from Hamilton Oct. 27, 1927 and Apr. 28, 1929.

2213 *C. sidus* Guen. Two specimens from Havre in September.

Parastichtis Hbn.

2219a *P. purpurea antapica* Sm. Fairly common in Pacific slope region in September and October. Rare elsewhere.

2220a *P. bicolorago verberata* Sm. Common in Pacific slope region. September-October. One specimen from Bozeman in September.

2223 *P. decipiens* Grt. One specimen from Hamilton, Sept. 19, 1929.

2225a *P. puta dusca* Sm. Intermountain and Pacific slope regions. August-September. Fairly common. Most of our specimens should probably be referred to the form *dusca*, although we occasionally catch some that can not be distinguished from eastern *puta*.

2226 *P. inops* Grt. One specimen from Malta, Sept. 6, 1928

2227 *P. agressa* Sm. Fairly common in the Plains region in September.

Atethmia Hbn.

2230a *A. pampina glenwoodi* B. & B. One specimen from Hamilton, Sept. 14, 1928.

Xanthia Ochs.

2233 *X. lutea* Strom. Intermountain and Pacific slope regions. September. Rare.

Homoglaea Morr.

2235 *H. carbonaria* Harv. Quite common in the Pacific slope region. September-May. Rare elsewhere. This species hibernates in the adult stage.

ACRONICTINAE

Amphipyra Ochs.

2239 *A. pyramidoides* Guen. Great Plains region. July-August. Rare. This does not come readily to light and may be more common than our records indicate.

2241 *A. glabella* Morr. Great Plains region. July-August. Fairly common. One specimen from Three Forks in 1928.

Dipterygia Steph.

2243 *D. scabriuscula* Linn. Great Plains region. June-August. Rare.

Septis Hbn.

2253 *S. lignicolora* Guen. Great Plains and Intermountain regions. July-August. Fairly common at Malta and Bozeman.

2258 *S. barnesi* Sm. Intermountain and Pacific slope regions. Four specimens in July and August.

2264 *S. plutonia* Grt. One larva of this species was picked up in lowlands near Bozeman in April 1924. Associated with this were *Polia lustralis* Grt. and *Chytolita morbidalis* Guen. The two first species were apparently feeding on new shoots of grass while *morbidalis* was feeding on dead leaves.

2265 *S. occidentis* Grt. Intermountain and Pacific slope regions. July-August. Very rare.

2268 *S. arctica* Bdv. Statewide in distribution. Fairly common in Intermountain and Pacific slope regions. July-August.

2269 *S. alia* Guen. Fairly common in Intermountain and Pacific slope regions, rare elsewhere. June-July.

2269a *S. alia rorulenta* Sm. Occurs with the typical form and is somewhat more common. June-July.

2279 *S. (Trachea) parcata* Sm. Intermountain region. Fairly common. June-August.

Trachea Ochs.

2275a *T. inordinata montana* Sm. Statewide in distribution, most common in the Intermountain and northern Plains regions. June-July.

2278 *T. cincta* Grt. Intermountain and northern Plains regions. June-July. Rare.

2281 *T. spaldingi* Sm. Scattered specimens from everywhere except the southern Plains region. May-July. Rare.

2282 *T. centralis* Sm. One specimen from Hamilton, July 22, 1928.

2285 *T. indocilis* Wlk. Intermountain and Pacific slope regions. June-July. Rare. One larva of this species was picked up Apr. 29, 1924 in a low marshy area near Bozeman. The same collection of larvae included *Polia renigera* Steph., *Spaciotis clandestina* Harr., *Euretagrotis inattenta* Sm. and *Eurois occulta* Linn.

2286a *T. mactata allecto* Sm. One specimen from Hamilton Sept. 17, 1928.

2288 *T. separans* Grt. Two specimens from Hamilton in May and June.

2290 *T. divesta* Grt. Two specimens from Hamilton in August, 1927.

2291 *T. finitima* Guen. Intermountain and Pacific slope regions. May-June. Rare.

2291a *T. finitima cerivana* Sm. Intermountain and Pacific slope regions. June. This form occurs with the typical form and is about equally rare.

2292.1 *T. perfumosa* Hamp. Two specimens from Hamilton, July 24 and 25, 1928.

2294 *T. binotata* Wlk. Pacific slope region. June-July. Rare.

2301. *T. indirecta* Grt. Statewide in distribution, common in Intermountain and Pacific slope regions. June-August.

2303. *T. characta* Grt. Northern Plains and Intermountain regions. June-July. Five specimens of this species were taken were taken in a portable light trap in open sage-brush country in the West Gallatin Canyon about 50 miles from Bozeman, altitude 6000 ft, July 31, 1927.

2305 *T. luteocinerea* Sm. Intermountain region. July. Rare. This species is more common in the dry Intermountain valleys than in higher altitudes.

2305,1 *T. pluraloides* McD. Great Plains region. June-July. Very rare.

It is quite probable that these last three names represent forms of a single species as there seems to be intergrading between them. *Characta* is apparently the parent form and occurs in rather moist places. Under dryer conditions the form *luteocinerea* is found, while on the Great Plains the form *pluraloides* represents an extreme variation.

2311a *T. commoda alberta* Sm. One specimen from Malta Aug. 1. 1928.

Euplexia Steph.

2318,1 *E. benesimilis* McD. One specimen from Hamilton, June 29, 1929.

Oligia Hbn.

2332a *O. violacea columbia* McD. Scattered specimens from Miles City, Bozeman and Hamilton in July and August.

2334 *O. egens* Wlk. Intermountain and Pacific slope regions. August. Rare. Probably most of this material belongs to the form *transfrons* Neum. although no attempt has been made to separate the forms.

2335 *O. fractilinea* Grt. Statewide in distribution. More common on the Great Plains. July-August.

2337 *O. misera* Grt. Scattered specimens from Miles City, Bozeman and Hamilton in June 1929. These were the first records for this species in the State.

2342 *O. tonsa* Grt. Intermountain and Pacific slope regions. July-September. Quite rare.

2342a *O. tonsa subjuncta* Sm. One specimen from Bozeman, July 15, 1928. There have probably been other specimens of this form collected, but not separated from the form *tonsa*.

Agroperina Hamp.

2344 *A. dubitans* Wlk. (*A. cogitata* Sm.) Common in the Intermountain and Pacific slope regions, rare elsewhere. June-August. I have been unable to find any differences either in structure or color between our series of *cogitata* and eastern specimens of *dubitans* so that the name *cogitata* is invalid. One larva of this species was picked up at Three Forks in May 1928 on hare's-ear mustard. There was no prepupal period, and the moth emerged in July.

2346 *A. lateritia* Hufn. Statewide in distribution. Apparently more common in the Intermountain and Pacific slope regions. June-August.

2353 *A. indela* Sm. Quite common at Bozeman in certain seasons. A few scattered specimens from other localities in July and August. The specific name *indela* must also apply to specimens recorded as *lineosa* Sm. and *pendina* Sm. as they are nothing but color forms, and *indela* has priority by one page. *Indela* was partly described as Bozeman material, and represents a washed out, faded form; *lineosa* is apparently the normal form and *pendina* a more intensely reddish tinted form. The name *couradi* Grt. was also applied by Smith to some Bozeman specimens but its status is rather uncertain with regard to this series.

2357 *A. helva* Grt. One specimen from Miles City, Aug. 18, 1929.

Eremobia Steph.

2359 *E. claudens* Wlk. One specimen taken at Bozeman, Sept. 7, 1927, was doubtfully referred to this species by McDunnough.

Taeniosea Grt.

2364 *T. discivaria* Wlk. Two specimens from Havre and three from Hamilton, in July and August.

Sidemia Staud.

2366 *S. longula* Grt. Scattered specimens from everywhere except the southern Plains region. Fairly common at Three Forks in certain seasons. July-August.

2367 *S. devastator* Brace. Statewide in distribution, abundant everywhere. The main flight is in late July and early August, but scattered specimens have been taken from May to October. This is the "glassy cutworm" of economic literature. The larva has been taken on wild grasses in various parts of the State, and I suspect that it worked with *A. orthogonia* in 1921 although only indirect evidence is available, as no moths were reared. This is one of our most abundant species but apparently confines itself largely to some of the wild grasses and rarely attacks cultivated crops. A few specimens of the brightly marked *speciosa* Morr. have been collected at various times but this is rare.

Protagrotis Hamp.

1603 *P. niveivenosa* Grt. Statewide in distribution, very common everywhere. June-August. Larvae which were collected in June 1910 on dandelion, pupated June 24 and the moths emerged on July 25.

Luperina Bdv.

2368 *L. stipata* Morr. One specimen from Malta Aug. 12, 1928 and one from Bozeman, Aug. 31, 1929.

2369 *L. burgessi* Morr. Northern Plains and Intermountain regions. July-September. Fairly common. This species was not recorded from Bozeman until 1926. In 1927 a flight of 58 specimens was captured in about a week, 23 of which were captured in a single night. Since that time only a few scattered specimens have been captured here.

2372 *L. posticata* Harv. Four specimens from Malta, Miles City and Hamilton in September.

2377 *L. extensa* Sm. Fairly common in Intermountain region, rare elsewhere. July-August.

2380 *L. passer* Guen. Common in the northern Plains and Intermountain regions from June to August. Rare elsewhere.

Cerma Hbn.

2412 *C. cuerva* Barnes. One specimen from Hamilton, Aug. 9, 1927, was identified as "near *cuerva*" by McDunnough.

Acronicta Ochs.

2427 *A. mansueta* Sm. One specimen from Hamilton, July 25, 1928.

2467 *A. falcula* Grt. One specimen of this species is in the Smith collection bearing the label "Montana-Collection St. Kemps."

2469 *A. grisea* Wlk. Intermountain and Pacific slope regions. June-July. Rare.

2483 *A. populi* Riley. One specimen from Hamilton, May 23, 1929.

2492 *A. dactylina* Grt. Three specimens from the northern Plains region in July.

2496 *A. impressa* Wlk. One specimen from Hamilton, May 22, 1928 and one from Malta, July 11, 1928.

2501 *A. sperata speratina* Sm. One specimen from Malta, June 8, 1929.

2506 *A. perdita* Grt. One specimen from Hamilton, May 22, 1928.

2509 *A. lanceolaria* Grt. One specimen from Hamilton, June 2, 1928.

Merolonche Grt.

2511 *M. lupini* Grt. Scattered specimens from Hamilton, Bozeman and Malta. May-July. Apparently less rare at Bozeman than elsewhere.

Simyra Ochs.

2514 *S. henrici* Grt. Three specimens from Malta in July 1928.

2514a *S. henrici fumosa* Morr. Two specimens from Bozeman in May and June 1928. This form with the smoky hind wings apparently replaces the typical form in the mountain regions.

Andropolia Grt.

2517 *A. diversilineata* Grt. One specimen from Three Forks and one from Hamilton. June.

2518 *A. contacta* Wlk. One specimen from Butte, Aug. 28, 1900. Two larvae of this species were found under burlap bands in an orchard near Thompson Falls in 1911. They pupated June 19, and one adult emerged July 15.

Hyppa Dup.

2531 *H. xylinoides* Guen. One specimen from Hamilton, June 24, 1928 and one from Bozeman, Aug. 23, 1929. These specimens are very similar to the ones which Wolley Dod recorded under his number 177 as *Hyppa* sp? (Can. Ent. 43:284, 1911). McDunnough regards this as very doubtfully distinct from the eastern *xylinoides*.

2533 *H. indistincta* Sm. One specimen from Hamilton and two from Bozeman in July.

Hadenella Grt.

2559 *H. pergentilis* Grt. Southern Plains and Intermountain regions. August-September. Rare.

Fotella Grt.

2561 *F. cylindrica* Grt. Northern Plains and Intermountain regions. July-August. Rare.

Catabena Wlk.

2564 *C. lineolata* Wlk. Great Plains region. May-August. Very common.

Laphygma Guen.

2575 *L. exigua* Hbn. Larvae of this species were collected on sugar beets near Billings in June 1910. This is our only record of this species and we have no adults.

Caradrina Ochs.

McDunnough has recently used this name for a genus in the subfamily Agrotinae, leaving this group temporarily without a generic designation. For the present we will retain these species under the old name.

2578 *C. extima* Wlk. Statewide in distribution. Abundant everywhere. This species has two broods. The moths of the first brood fly in May and June and the second brood from July to September. A single larva of this species picked up on dandelion at Bozeman in April 1925, pupated May 23 and the moth emerged June 17.

2579 *C. meralis* Morr. One specimen from Three Forks Sept. 3, 1927 and one from Hamilton Aug. 15, 1928. Other specimens of this species have probably been secured but it runs fairly close to *extima* and has probably been overlooked. 2583 *C. atrostriga* B. & McD. This little species is fairly common at Three Forks in August and September. Scattered specimens have been secured in other places.

(to be continued)

REVISION OF THE NORTH AMERICAN AEGIALIINAE*
(COLEOPTERA)

BY W. J. BROWN,
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The following study is based on the types of LeConte and Horn and material from the American Museum, Museum of Comparative Zoology, Canadian National Collections and from the collections of Messrs. Owen Bryant, C. A. Frost, Ralph Hopping, W. Knaus, and J. B. Wallis. Dr. W. Horn supplied specimens of two European species, of *Aegialia rufa* Fab. and *sabuleti* Panz.; these were of much aid in the study of the subgenera, the descriptions of which were made as detailed as possible so that descriptions of the species could be shorter.

Among the characters most useful in distinguishing some of the species are those of the anterior tibiae. The student should remember that the tibial form is readily altered by wear so that the teeth often become shorter and more acute in older specimens. The hind tibial spurs, also, are often altered by wear. The accompanying figures and descriptions refer, of course, to perfect specimens. It should be remembered, too, that reddish-yellow examples of species normally dark brown in color are not uncommon in collections. These paler examples are usually teneral individuals and are most commonly observed among the species of the sub-genus *Psammoporus*.

The present study was made with a binocular microscope giving a magnification of forty-five diameters. Comparative measurements and drawings were made with the aid of an eyepiece micrometer. In the measurements of the hind tibiae, the length given in each case refers to the length of the inner side; the width is the shortest distance between the inner side and the external apical angle.

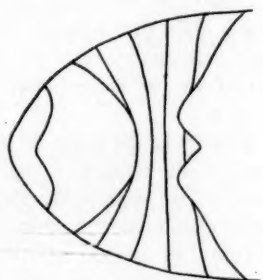
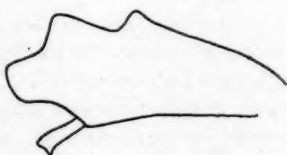
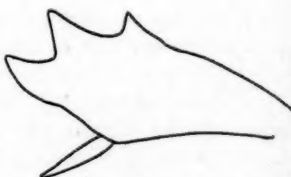
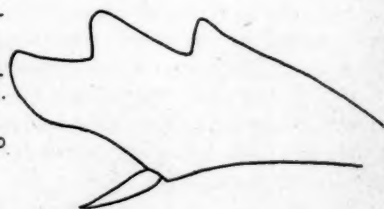
Aphodius clypeatus Say, which may be an *Aegialia*, and *Aegialia exarata* Mann. remain unidentified; there is nothing in the description of the latter that will distinguish it from several species of the subgenus *Psammoporus*.

The subfamily Aegialiinae includes those North American Laparostict Scarabaeidae which possess the following combination of characters: antennae of nine segments, clypeus not expanded to conceal the mandibles, abdominal venter of six visible segments.

TABLE TO GENERA

Middle coxae widely separated. Abdominal segments except the last pruinose, strongly narrowed at middle; the penultimate segment visible only on the sides; the last segment longer than the others combined. Elytral inter-

*Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

blanchardi*pusilla**humeralis* ♀*montana* ♂*terminalis* ♂*nana* ♂*criddlei* ♂*cylindrica* ♂*lacustris* ♀

vals with short hairs *Micraegialia* n. gen.
 Middle coxae narrowly separated. Abdominal segments not pruinose, not narrowed at middle; the penultimate segment visible throughout the abdominal width; the last segment much shorter than the others combined. Elytra without hairs *Aegialia* Lat.

***Micraegialia* n. gen.**

Body very small, oblong oval, robust, strongly convex. Terminal segment of maxillary palpus elongate oval. Clypeus punctate, without granules or rugae; the anterior margin fimbriate with flattened hairs.

Pronotum rather long; the apical angles moderately produced, very acute, basal angles not well defined, very obtuse and very broadly rounded; the side and basal margins fimbriate with flattened hairs.

Elytra with the humeri very finely dentate, finely striate; each puncture of the intervals bearing a hair.

Middle coxae widely separated; the intercoxal process of the mesosternum feebly carinate. Abdomen except the last segment pruinose; the second, third, and fourth segments strongly narrowed at middle; the penultimate segment visible only at the sides, the median part hidden by the fourth segment; the last segment longer than the others together at middle.

Anterior tibia slender. Middle and hind femora elongate oval, subequal in size, very finely pubescent. Middle and hind tibiae slender; the former with a small but distinct transverse ridge on outer side at apical third; the latter without transverse ridges. Tibial spurs all slender. Hind tarsus long.

Type - *Aegialia pusilla* Horn.

***Micraegialia pusilla* Horn**

Aegialia pusilla Horn, Trans. Am. Ent. Soc., XIV, 99 and 102, 1887

Length 1.87 - 2.45 mm.; width .92 - 1.2 mm. Very dark brown, venter paler, legs reddish yellow; strongly shining.

Head three-fourths as wide as pronotum; coarsely and rather closely punctate throughout; clypeus microscopically alutaceous, without trace of granules; genae not at all prominent, their margins continuous with those of the clypeus.

Pronotum slightly more than four-fifths as long as wide, widest at middle; the side margins feebly and evenly arcuate, feebly but distinctly crenate; basal margin distinctly sinuate each side of middle, with a very fine marginal line. Disk with a small indistinct fovea on each side near middle of lateral declivity; coarsely punctate, the punctures sparse at middle, rather close on the sides, the median line rather broadly impunctate except at base and apex, a few indistinct, microscopic punctules scattered among the punctures.

Elytra slightly wider than the pronotum, widest at middle, the sides very feebly arcuate in basal half; humeri finely dentate. Disk with fine, moderately impressed striae, these with fine, distant punctures; intervals feebly convex, each with two irregular rows of fine punctures, the punctures equal in size to those of the striae, each bearing a very short yellow hair.

Metasternum finely punctate, the punctures bearing short yellow hairs.

Anterior tibia slender, the teeth well separated, narrow, scarcely rounded.

Middle and hind femora with a few hair-bearing punctures. Hind tibiae slender, almost three times as long as wide and very slightly longer than the hind tarsus; hind tibial spurs slender, parallel, sharply pointed at apex.

Male. Metasternum rather closely punctured at middle. Abdomen not very convex, the last segment not distinctly alutaceous.

Female. Metasternum very sparsely punctured at middle. Abdomen strongly convex, the last segment distinctly alutaceous.

This species is represented in the collection at hand by four specimens of each sex from Aweme and Birtle, Man., and Cawston, B. C. It differs from all other species here considered by the small size, punctate clypeus, flattened fimbriae of the clypeus and pronotum, pubescent elytra and femora, and by the unusual mesosternal and abdominal characters. In the accompanying figure, the abdomen and pygidium are shown in ventral aspect. The species was described from Washington Territory; the type is a rather large female.

Aegialia Latr.

Aegialia Latreille, Gen. Crust. et Ins., II, 96, 1807.

Type—*Aphodius globosus* Ill. (*arenaria* Fab.).

TABLE TO SUBGENERA

1. Terminal segment of maxillary palpus somewhat securiform, much wider at basal third than at base. Form elongate and subparallel. Color reddish-yellow2
- Terminal segment of maxillary palpus cylindrical. Form variable but never notably elongate. Color rarely reddish-yellow, usually dark brown or blackish3
2. Pronotum with well-defined punctures, without traces of rugae; basal marginal line distinct and entireI. *Leptaegialia* n. subgen.
- Pronotum roughened by indistinct, poorly defined punctures and feeble rugae; basal marginal line interrupted at middle in our speciesII. *Anomalaegialia* n. subgen.
3. Front impunctate or virtually so, usually granulate. A large area at the hind pronotal angles impunctate or virtually soIV. *Aegialia* in sp.
- Front punctate, the punctures at least moderately coarse and close. Pronotum near the hind angles always coarsely and closely punctateIII. *Psammoporus* Thoms.

I. *Leptaegialia* n. subgen.

Body elongate, parallel, subdepressed. Terminal segment of maxillary palpus somewhat securiform, much wider at basal third than at base. Clypeus finely and strongly roughened, subgranulate, the granules not well defined.

Pronotum with the lateral and basal margins more or less crenate, the latter with the marginal line distinct and entire, arcuate and without trace of sinuations; the anterior angles moderately produced, very acute; the basal angles not well defined, very obtuse, and very broadly rounded; disk with intermixed coarse and fine punctures, without coarse punctures on an area near the hind angles.

Anterior tibiae wide, the middle and apical teeth never elongate. Hind tibial spurs never foliaceous; hind tarsi long.

Sexual characters evident in the anterior tibial spurs, these spurs in the male wide, parallel, truncate at apex, the inner apical angle prolonged inwardly and very acute; the spurs normally slender and acute at apex in the female.

Type—*Aegialia humeralis* n. sp.

This subgenus is characterized primarily by the elongate, parallel, sub-depressed form; the subsecuriform terminal segment of the maxillary palpus; and by the secondary sexual characters. These sexual characters are shown in the accompanying figures.

TABLE TO SPECIES

- | | |
|--|----------------------------|
| 1. Hind tibia three times as long as wide; hind tibial spurs less stout, parallel | 2 |
| Hind tibia twice as long as wide; hind tibial spurs stout, slightly wider at middle than at base; humeri not dentate | 3. <i>rufescens</i> Horn. |
| 2. Humeri finely but strongly dentate; pronotal margins strongly crenate near the front and hind angles | 1. <i>humeralis</i> n. sp. |
| Humeri not dentate; pronotal margins very feebly crenate near the angles | 2. <i>montana</i> n. sp. |

1. *Aegialia humeralis* n. sp.

Length 3.5 - 4 mm.; width 1.4 - 1.6 mm. Reddish yellow throughout, the venter usually paler; shining.

Head three-fourths as wide as pronotum. Clypeus very finely and closely granulate; front punctate, the punctures not coarse, distinct throughout, confluent near the frontal suture, dense but separated on the vertex.

Pronotum slightly more than four-fifths as long as wide, widest at middle; the side margins feebly and evenly arcuate, distinctly crenate in apical half; basal margin strongly crenate at the hind angles. Disk with a small, indistinct fovea on each side near middle of lateral declivity; the fine punctures scarcely distinct, sparse and regular, somewhat larger and close near anterior margin; the large punctures somewhat irregularly distributed, usually rather sparse and always quite sparse at middle in anterior half, not attaining the anterior margin and absent or very sparse on each side near the hind angles.

Elytra subequal in width to pronotum; humeri finely but strongly dentate. Striae moderately impressed; coarsely punctate, the punctures separated by distances equal to their own diameters; intervals feebly convex, very finely and rather closely punctulate.

Metasternum and abdomen finely and sparsely punctate, each with a few coarse punctures near the side margins. Anterior tibiae wide; the teeth well separated, acute, rather narrowly rounded. Middle and hind femora very finely, indistinctly punctulate. Middle and hind tibiae long and slender, the latter three times as long as wide; hind tibial spurs slender, parallel, very sharply pointed; hind tarsus three-fourths as long as the tibia.

Holotype—♂, Hastings Co., Ont., 1884, (Evans); No. 3079 in the Canadian National Collection, Ottawa.

Allotype—♀, Mt. Washington (Subalpine), N. H., July, 1896; in the Museum of Comparative Zoology.

Paratypes—2 ♀, Framingham, Mass., May 8, 1909, (C. A. Frost); 1 ♂, 1 ♀, Three Mile Id., N. H., 1 ♀, West Point, N. Y., May 24, 1910, (W. Robinson).

The hind tibial spurs are more slender in this species than in either of the others.

2. *Aegialia montana* n. sp.

Length 3.6 - 4.6. mm.; width 1.5 - 1.9 mm. Reddish-yellow throughout, the venter usually paler; shining.

Head about three-fourths as wide as pronotum. Clypeus finely and closely granulate; front punctate, the punctures coarse, distinct throughout, confluent near the frontal suture, dense but separated on the vertex.

Pronotum four-fifths as long as wide, widest at middle; the side margins feebly and evenly arcuate, obsoletely crenate in apical half; basal margin obsoletely crenate at the hind angles. Disk usually with a small, indistinct fovea on each side near middle of lateral declivity; the smaller punctures scarcely distinct, sparse and regular, somewhat larger and close near the anterior margin; the large punctures somewhat irregularly distributed but everywhere sparse, not attaining the anterior margin and absent on each side on a large area extending from the hind angles to or almost to the front angles.

Elytra subequal in width to pronotum; humeri slightly prominent, not dentate. Striae moderately impressed; coarsely punctate, the punctures separated by distances equal to their own diameters; intervals feebly convex, apparently impunctate but with a few very fine, indistinct punctures.

Metasternum and abdomen finely and sparsely punctate, each with a few coarse punctures near side margins. Anterior tibiae wide, the teeth acute but rounded; the emargination separating the two most apical teeth very shallow. Middle and hind femora very finely and indistinctly punctulate. Middle and hind tibiae long and slender, the latter about three times as long as wide; hind tibial spurs moderately stout but parallel and sharply pointed; hind tarsus three-fourths as long as the tibia.

Holotype—♀, Revelstoke Mt., B. C., July 17, 1925, (A. Denny); No. 3080 in the Canadian National Collection, Ottawa.

Allotype—♂, Yellowstone Park, Wyo., Sept 1-19, 1885; in the Museum of Comparative Zoology.

Paratypes—1 ♀, same data as allotype; 1 ♂, Veta Pass, Col.

The form of the anterior tibia in this species is unique. The hind tibial spurs are stouter than those of *humeralis* and less stout than in *rufescens*.

3. *Aegialia rufescens* Horn.

Aegialia rufa Le Conte nec. Fabricius, Proc. Am. Phil. Soc., XVII, 610, 1878.

Aegialia rufescens Horn, Trans. Am. Ent. Soc., XIV, 99 and 100, 1887.

Length 3.4 mm.; width 1.4 - 1.8 mm. Reddish-yellow throughout, the venter usually paler; shining.

Head three-fourths as wide as pronotum; granulate, the granules very fine and close, not well defined on the front; vertex smoother, with a few distinct punctures.

Pronotum three-fourths as long as wide, widest at middle; the side margins feebly and evenly arcuate, obsoletely crenate in apical half; basal margin obsoletely crenate at the hind angles. Disk with a small, indistinct fovea on each side near middle of lateral declivity; the fine punctures scarcely distinct, sparse and regular throughout, somewhat larger and closer near the anterior margin; the coarse punctures somewhat irregularly distributed but everywhere sparse, not quite attaining the anterior margin and absent on each side near the hind angles.

Elytra subequal in width to pronotum; humeri slightly prominent, not

dentate. Striae moderately impressed; coarsely punctate, the punctures separated by distances equal to their own diameters; intervals feebly convex, without punctures.

Metasternum and abdomen finely and sparsely punctate, each with coarse punctures near the side margins. Anterior tibia wide, the teeth well separated, acute but rounded. Middle and hind femora finely, sparsely and indistinctly punctured. Middle and hind tibiae rather short and stout, the latter twice as long as wide; hind tibial spurs stout, slightly but very distinctly wider at middle than at base, rather bluntly pointed; hind tarsus about six-sevenths as long as the tibia.

This species is represented in the collection at hand by two males and four females from Aweme, Man., Saskatoon, Sask., and Calgary and Edmonton, Alta. In it, the pronotum is more strongly transverse than in either *humeralis* or *montana*. The anterior tibiae are similar to those of *humeralis* except that the teeth are more slender and separated by deeper emarginations.

The type, from Marquette, Mich., is a female measuring 4.6 mm. A specimen from the type locality and associated with the type by LeConte is *humeralis*; LeConte noted some of the specific differences in his original description of the present species.

II. *Anomalaegialia* n. subgen.

Body elongate, parallel, moderately robust and convex. Terminal segment of maxillary palpus somewhat securiform, much wider at basal third than at base. Clypeus with well defined, rounded granules.

Pronotum with the margins not or very feebly crenate; the anterior angles more or less produced; basal angles distinct but obtuse and very broadly rounded; base evenly arcuate; basal marginal line very fine, feebly impressed; disk with very poorly defined rugae and punctures.

Anterior tibiae rather wide; the teeth well separated, with rounded apices; the middle and apical teeth elongate. Hind legs very stout; the tibiae with many small tubercles on the under side; the spurs foliaceous; the tarsi of moderate length.

Sexual characters not apparent.

Type—*Aegialia spissipes* Lec.

This subgenus includes the European *rufa* and is characterized primarily by the cylindrical form, the securiform terminal segment of the maxillary palpus, the type of pronotal sculpture, and by the lack of secondary sexual characters. The anterior tibiae are exactly as in the subgenus *Aegialia*; the closely tuberculate hind tibiae are unique.

4. *Aegialia spissipes* Lec.

Aegialia spissipes Le Conte, Trans. Am. Phil. Soc., XVII, 611, 1878; Horn, Trans. Am. Ent. Soc., XIV, 100 and 105, 1887.

Length 4.2 mm.; width 1.9 mm. Reddish-yellow, shining.

Head seven-tenths as wide as the pronotum; finely and closely granulate, without punctures; genae slightly prominent, their margins not quite continuous with those of the clypeus.

Pronotum seven-tenths as long as wide, widest just behind the middle; the sides moderately arcuate, very indistinctly crenate or entire; apical angles slightly produced, subacute; the basal marginal line very fine, feebly impressed, inter-

rupted at middle. Disk without fovea, not flattened at the anterior angles; feebly subrugose and subpunctate, distinctly roughened throughout but without distinct granules, rugae, or punctures.

Elytra slightly wider than the pronotum, the sides very feebly arcuate in basal half; humeri rounded, not prominent. Disk with rather fine, moderately impressed striae; the striae with fine, very feebly impressed, very indistinct punctures; intervals flat, impunctate.

Metasternum alutaceous on the sides. Abdomen shining at middle, alutaceous and with a few punctures on the sides; the last segment convex, without impressions. Middle and hind femora with a few coarse punctures near the margins, the latter twice as wide as the former. Middle tibiae rather stout, with the usual spines but without tubercles, with elongate, very slender spurs. Hind tibiae stout, not quite twice as long as wide, without transverse ridges; the underside with small, closely placed tubercles throughout; the inner margin arcuate basally; the spurs foliaceous, each about twice as long as wide; hind tarsus about two-thirds as long as the tibia.

Of this species, I have seen three specimens from Tyngsboro, Mass., and the type from Marquette, Mich. The type measures 4.6 mm.; except in size, it agrees very well with the Tyngsboro specimens described above. The hind femora and tibiae are stouter in this than in any other species of our fauna.

The European *Aegialia rufa* Fab. is closely allied to *spissipes*. In the pronotum of the former, however, the apical angles are very strongly produced, the lateral margins are very feebly but more distinctly crenate, the punctures and rugae are better defined, the sublateral fovea on each side is distinct, and the basal marginal line is entire; the inner margin of the hind tibia is straight from base to apex, also. I have seen a single specimen of *rufa*.

III. *Psammoporus* Thoms.

Psammoporus Thomson, Skand. Col. V, 72, 1863.

Dimalia Mulsant, Hist. Nat. Col. Fr. Lamell., 406, 1871.

Body oblong, subcylindrical, moderately robust and convex. Terminal segment of maxillary palpus cylindrical. Clypeus roughened, usually distinctly granulate, the granules not rounded but more or less rugiform; front at least moderately closely and coarsely punctate; genae never prominent, their margins continuous with those of the clypeus; head seven-tenths as wide as the pronotum.

Pronotum seven-tenths as long as wide; the side and basal margins more or less crenate; the apical angles slightly produced, acute; basal angles obtuse, very broadly rounded; base usually more or less sinuate or oblique near the hind angles, the marginal line distinct and entire; disk coarsely and closely punctate near the hind angles. Elytral intervals punctate or not; the humeri not dentate except in the type species.

Anterior tibiae variable, always at least moderately wide, never with the middle and apical teeth elongate. Hind legs slender; the tibiae about three times as long as wide, usually with strong transverse ridges; the tibial spurs slender; the tarsi three-fourths as long as the tibiae.

Sexual characters evident in the anterior tibiae and in the last abdominal segment; this segment broadly concave or flattened at middle and sometimes with other modification in the male, simply convex in the female; the tibial teeth more acute and sometimes otherwise modified in the male.

Type—Scarabacus sabuleti Panz.

This group is characterized primarily by the remarkably constant form, the type of sculpture, and the sexual characters. As in *Leptaegalia* the anterior tibiae differ more or less among the species.

The European *Aegalia sabuleti* Panz. agrees very well with *criddlei* in most of its characters. In the former, however, the humeri are very distinctly dentate and the sinuation of the basal pronotal margin near the hind angles is so strong that an obtuse angle which is distinct in both sexes but more prominent in the male is produced on this margin near the fifth elytral stria; by these characters, *sabuleti* differs from all North American species.

TABLE TO SPECIES

- | | |
|--|-----------------------------|
| 1. Elytra opaque, pronotum very feebly shining | 5. <i>opaca</i> n. sp. |
| Elytra and pronotum shining | 2 |
| 2. Front rather finely, not very closely punctate; pronotum sparsely punctate at middle | 6. <i>terminalis</i> n. sp. |
| Front coarsely and closely punctate; pronotum closely punctate throughout. | 3 |
| 3. Length 3.4 mm.; punctures of pronotum and elytral striae very coarse, those of the striae near the lateral margins as wide as the intervals | 7. <i>nana</i> n. sp. |
| Length 3.6 mm. or more; punctures of the pronotum and elytral striae less coarse | 4 |
| 4. Apices of anterior tibial teeth more acute; elytra near lateral and apical margins distinctly alutaceous | 8. <i>criddlei</i> n. sp. |
| Apices of anterior tibial teeth less acute; elytra near the margins not or very feebly alutaceous | 5 |
| 5. Elytral intervals with distinct punctures; median line of pronotum usually broadly and feebly impressed on basal third | 9. <i>cylindrica</i> Esch. |
| Elytral intervals virtually impunctate; median line of pronotum not impressed | 10. <i>lacustris</i> Lec. |

5. *Aegalia opaca* n. sp.

Length 3.8 - 4.8 mm.; width 1.7 - 2.2 mm. Body moderately convex. Pale reddish brown or blackish; front and pronotum very feebly shining, elytra opaque; clypeus and venter shining.

Front moderately coarsely, densely punctate, the punctures more or less confluent near the clypeus; clypeus closely granulate.

Pronotum with the side margins subparallel in basal half, feebly arcuate anteriorly, strongly crenate; basal margin strongly crenate except at middle, arcuate, slightly oblique near the hind angles. Disk with a feeble fovea on each side near middle of lateral declivity, depressed at front angles, the margin near the latter rendered somewhat explanate; coarsely punctate, the punctures less coarse anteriorly, dense near the anterior margin and on the lateral declivities, close elsewhere; the intervals between the punctures microscopically alutaceous.

Elytra slightly wider than the pronotum; the sides in basal half not arcuate, feebly diverging from base to middle; humeri prominent, subdentate. Disk with coarse, moderately impressed striae; the striae closely and coarsely punct-

ate; intervals feebly convex, with a few fine punctures, densely and microscopically alutaceous.

Metasternum without distinct punctures, the sides alutaceous; with a small but very distinct tumidity on each side of the median line just in front of the hind coxae. Abdomen alutaceous, not distinctly so at middle, with a few punctures on the sides. Anterior tibiae moderately wide; the teeth well-separated, not notably stout or slender, with rounded apices. Middle and hind femora microscopically punctulate. Hind tibia with strong transverse ridges on the outer side, the tibial spurs slender, parallel, sharply pointed.

Male. Last ventral segment broadly concave at middle. Teeth of anterior tibiae more acute, the inner margin of the apical much less broadly rounded.

Holotype—♂, Copper Mtn., B. C., May 3, 1930, (G. Stace Smith); No. 3081 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—9♂, 16♀, same data as holotype; 1♀, Midday Valley, Merritt, B. C., July 8, 1924, (N. L. Cutler); 1♂, 3♀, Cascade Mtn., Banff, Alta., June 29, 1925 and May 22, 1926, (O. Bryant).

In this species, the metasternal tumidities and the serrations of the pronotal margins are more strongly developed than usual. The teeth of the anterior tibiae are similar to those of *lacustris* and *cylindrica*.

6. *Aegialia terminalis* n. sp.

Length 3.8 - 4.4 mm.; width 1.7 - 2 mm. Body moderately convex. Very dark reddish-brown, the legs paler, shining.

Front rather closely, not coarsely punctate; clypeus somewhat roughened but without distinct granules.

Pronotum widest slightly behind the middle; the side margins feebly and evenly arcuate, feebly but distinctly crenate; basal margin arcuate, near the hind angles feebly crenate and not at all sinuate or oblique. Disk with a small, indistinct fovea on each side near middle of lateral declivity; not at all flattened near the anterior angles; coarsely punctate, the punctures close and slightly less coarse on the sides, very sparse on the large median area.

Elytra very slightly wider than the pronotum, the sides subparallel in basal half; humeri rounded and not prominent. Disk with fine, moderately impressed striae; the striae with moderately coarse, close punctures; intervals feebly convex, impunctate, or with a few very indistinct, microscopic punctures, without trace of alutaceous sculpture.

Metasternum without distinct punctures, the sides narrowly alutaceous, not at all tumid on each side of median line before the hind coxae. Abdomen alutaceous and with a few punctures except at middle, this median line shining and without distinct punctures. Anterior tibiae wide, the teeth wide but with very acute apices, the emargination separating the two most apical teeth very shallow. Middle and hind femora microscopically punctulate. Hind tibiae with feeble traces of transverse ridges on the outer side, the tibial spurs very slender, parallel, very sharply pointed.

Male. Last abdominal segment broadly concave at middle; the apex at

middle produced to form a very small, very acute tubercle. Anterior tibia as figured.

Female. Anterior tibia approaching the form normal in the males of this group; the teeth less acute, the apical separated from the middle by a right angle, not turned inward.

Holotype.—♂, Edmonton, Alta., May 28, 1925, (O. Byrant); No. 3082 in the Canadian National Collection, Ottawa.

Allotype.—♀, same data.

Paratypes.—2 ♂, 3 ♀, same data as holotype; 1 ♂, Calgary, Alta., Feb. 1, 1924, (O. Bryant); 5 ♂, 3 ♀, Saskatoon, Sask., April 28, Sept. 11 and Oct. 30, 1928, (K. M. King); 2 ♀, Aspen, Colo., July 24-27, 1919.

The species differs from all others of the subgenus in the sculpture of the head and pronotum, the form of the anterior tibiae, and in the male sexual characters.

7. *Aegialia nana* n. sp.

Length 3.4 mm.; width 1.6 mm. Body rather strongly convex. Dark reddish brown, the legs paler; shining.

Front rather coarsely, very densely punctate; clypeus closely granulate.

Pronotum widest slightly behind the middle; the side margins feebly arcuate, feebly but distinctly crenate; basal margin distinctly crenate except at middle, feebly sinuate each side of middle, slightly oblique before the hind angles. Disk with a feeble fovea on each side near middle of lateral declivity, feebly but distinctly flattened at the anterior angles, coarsely punctate; the punctures close, especially on the lateral declivities and near anterior margin; dense near the front angles.

Elytra slightly wider than the pronotum, the sides scarcely arcuate in basal half; humeri prominent. Disk with moderately impressed striae, these coarsely and very closely punctate; the punctures at middle equal to those of the pronotum, those on the sides larger; intervals moderately convex, not alutaceous, with a few fine, indistinct punctures.

Metasternum feebly alutaceous on the sides, not tumid at middle in front of the hind coxae. Abdomen alutaceous, indistinctly so at middle, with a few punctures on the sides. Anterior tibiae moderately wide; the teeth rather slender, well separated, with narrowly rounded apices. Hind tibiae with strong transverse ridges on the outer side, the tibial spurs quite slender, parallel, very sharply pointed.

Male.—Last ventral segment broadly concave at middle.

Holotype.—♂, Merrimack River Drift, Tyngsboro, Mass., April 25, 1901, (F. C. Bowditch collection) in the Museum of Comparative Zoology.

Paratype.—♂, same data; No. 3083 in the Canadian National Collection, Ottawa.

This species is smaller, slightly more robust, and relatively more coarsely punctured than any other species in the subgenus.

(to be continued)

A NEW TAENIOTHRIPS ON GLADIOLUS

BY DUDLEY MOULTON AND JOHN B. STEINWEDEN

San Francisco, California

Taeniothrips gladioli n. sp.

Female holotype: Color: head and prothorax dark brown, pterothorax dark brown with some red hypodermal pigmentation, abdomen uniformly brown. Antennal segments uniformly dark brown with the exception of the third which is yellowish brown. Legs concolorous with body except the tarsi and distal ends of fore tibiae which are light yellowish brown. Fore wings brown, light in basal third. Ocelli with orange red crescents. Body spites dark brown.

Total body length 1.65 mm.; head, length .127 mm., width .180 mm.; prothorax, length .150 mm., width .220 mm.; pterothorax, length .300 mm., width .315 mm.; greatest width of abdomen .375 mm. Segments of antennae: length (width) I, 20 (32); II, 44 (28); III, 53 (24); IV, 56 (20); V, 40 (21); VI, 64 (21); VII, 9 (8); VIII, 12 (6); total length .285 microns. Length of spines: interocellar 12 m., on posterior angles of prothorax, outer 56 m., inner 64 m., inner pair on posterior margin of prothorax 24 m., on metanotum, outer pair 28 m., inner pair 40 m., on ninth abdominal segment, inner 160 m., outer 125 - 135 m., on tenth abdominal segment 130 microns.

Head wider than long, cheeks arched. Eyes large, prominent and slightly protruding, occupying about one-half the side of the head. Surface of head behind eyes cross striated. Interocellar spines small, located midway on a line connecting anterior ocellus with posterior ocelli. A row of five small setae behind each eye. Ocelli prominent. Antennae moderately slender, slightly more than twice as long as head.

Pronotum with fine cross striations and sparsely set with small setae, spines on posterior angles short and stout, a series of three small spines on each side along the posterior margin, the inner of which is slightly longer than the others. Median spines on metanotum rather small, placed approximately 20 mm. back of anterior margin. Wings fully developed. Spines as follows: costa 26 to 27, fore vein with 7 (4 - 3) at base, 4 to 8 in distal portion, usually 7 or 8; hind vein with 14 or 15.

Abdomen, broad, not suddenly narrowed at apex. Comb on eighth segment fully developed with closely set setae. Spines on ninth and tenth segment strong.

Male allotype: With color similar to the female except uniformly a little lighter.

Measurements: Total body length 1.2 mm.; head, length .117 mm., width .15 mm.; prothorax, length .13 mm., width .19 mm. Segments of antennae: length (width) I, 20; II, 34 (23); III, 50 (20); IV, 50 (16); V, 30 (18); VI, 53 (20); VII, 6; VIII, 10; total length 226 microns.

Numbers and placement of prominent head, thorax and wing spines as in female. Eighth abdominal segment with weak comb at the sides only. Ninth segment with two pairs of median dorsal spines, the second being somewhat posterior and outward from the inner pair and each with a blank pit above, there is a third smaller pair of spines somewhat anterior and laterad from the blank pits. Depressions on sternites two to six broad and sole-shaped.

Type Material: ♀ holotype, ♂ allotype, numerous ♀ and 2 ♂ paratypes taken on *Gladiolus*, August, 1, 1930. Holotype and allotype deposited in the Canadian National Collection; ♂ paratypes in authors' collection.

Type Locality: Vineland Station, Ontario, Canada. Also species found on *Gladiolus* at Cleveland, Ohio.

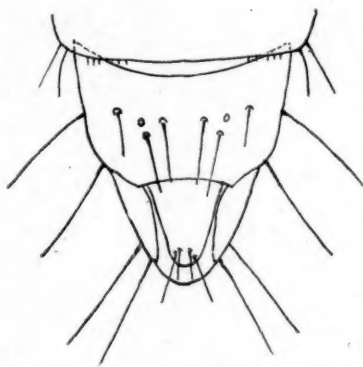


Fig. 1. Ninth Abdominal Segment of *T. gladioli* M. & S.

The chaetotaxy of the fore wings separates this species from all others except a small group of nine or ten species, the closest of which are compared as follows: It resembles *vulgatissimus* Hal. in color and general appearance, but *vulgatissimus* usually has only three distal bristles on the fore vein of the fore wing, never more than four, also the interocellar spines and those on the posterior angles of the prothorax are considerably longer. *Spiranthidis* Bagn. has five to seven spines on the distal portion of the fore wing and is similar in color, except that the entire antenna is dark, also the third and fourth antennal segments and the interocellar spines are longer. *Abyssiniae* Moulton, *annulatus* Karny, *canavaliae* Moulton and *atratus* Haliday, are all close to *gladioli* in color and chaetotaxy of wing and body, but can be separated as follows: *Abyssiniae* has longer spines on the posterior angles of the prothorax, a longer inner pair of median spines on the metanotum which are placed close to the anterior margin and it has only four or five distal spines on the fore vein of the fore wing. *Annulatus* Karny has longer spines on the posterior angles and margin of the prothorax and longer interocellars. The fore wings of *canavaliae* are entirely dark and the comb on the eighth abdominal segment is incomplete or rudimentary and the interocellar spines are longer and are placed almost directly in front of the posterior ocelli instead of being on each side of the anterior ocelli. *Atratus* has seven to eleven distal bristles on the fore vein of the fore wing, but seldom as few as seven or eight, the prevailing number in *gladioli*; also the interocellar spines and those on the posterior angles of the prothorax are longer.

SOME NOTES ON BEES OF THE GENUS *ANDRENA*.

BY T. D. A. COCKERELL,

University of Colorado.

Andrena nubecula race *tristicornis* n. race. Flagellum entirely black. Lakeside, Que., Aug. 20, 1929 (*J. W. Buckle*). Also from Milwaukee, Wis., July 26, 1902 (*Graenicher*). The specimens are females. The Lakeside specimen has curiously aberrant venation. On both sides the outer discoidal cell is divided into two about the middle, the distal portion being about square; in addition to this, on the right side there is an elongated cell below the third cubital, ending narrowly at the outer recurrent nervure and having its base on the end of the first recurrent, the vertical vein dividing the discoidal cell arising from about the end of the second fifth of its lower side. On the left side this cell is small, triangular, not extending half way to the second recurrent nervure.

Typical *A. nubecula* Smith, with the flagellum red or mainly red beneath, I have from Lincoln, Nebraska, and Waldsboro, Maine (*Lovell*).

Andrena vicina Smith. Females. Lakeside, Que.,* June 16 (*Buckle*). Montreal May 22 (*Buckle*). The Montreal one has the thoracic hair red dorsally, which gives it some resemblance to *A. idahorum* Viereck, but the process of labrum is quite different.

Andrena crataegi Rob. Females. Montreal, June 15 to 26 (*Buckle*).

Andrena multiplicata Ckll. Females. Shawbridge, Que., July 16 (*A. F. Winn*) Lakeside, Que., July 14 (*Buckle*)

Some time ago, Miss Grace Sandhouse very kindly examined some of my types of Rocky Mountain *Andrena*, which are in the U. S. National Museum, and concerning which some doubts had arisen. The information given is published below, as it is important for the understanding of the species.

Andrena wilmattae Ckll. The type is about 12 mm. long, not 8 mm. as stated. It agrees in all respects with *A. commoda* Sm., as determined at the Museum.

Andrena johnsoniana Ckll. Viereck, in litt., thought that this was *A. cressonii* Rob. The type has the pubescence worn but it is not *A. cressonii*, differing as follows. Abdominal tergites less densely and distinctly punctured; apical fasciae of tergites worn, but apparently originally not so dense; propodeum dull and more coarsely sculptured; front punctostriate (in *cressonii* densely and deeply punctured, with a medial polished streak above the carina extending to anterior ocellus); second cubital cell higher than broad, receiving first recurrent nervure very near apex (in *cressonii* it is as broad as long and receives recurrent near middle); third cubital cell on marginal about equal to first plus second (in *cressonii* third about equal to first.)

Andrena albovirgata Ckll. and *A. xanthigera* Ckll. were considered by Viereck to be *A. canadensis* Dalla Torre. Miss Sandhouse concludes that my two supposed species are really one, but on comparing *A. albovirgata* with *A. canadensis* (as determined by Viereck) finds that the former is certainly distinct, as follows. Head, viewed from the front, shorter and broader; facial foveae not distinctly visible when viewed with naked eye (clearly visible in

*Lakeside is on Montreal Island, 14 miles west of Montreal P. O. Shawbridge is in Laurentian Mts., 50 miles north of Montreal. A. F. W.

canadensis); pubescence in foveae not pure white and densely appressed as in *canadensis*; front more coarsely striate; clypeus with punctures about twice as close together; mesoscutum much more sparsely punctured; dorsal surface of prepedum almost shining, reticulate (in *canadensis* dull and coarsely granular).

OBITUARY

J. H. EMERTON

In 1882 there appeared in the Transactions of the Connecticut Academy an article on the New England Spiders of the Family Theridiidae. It was by J. H. Emerton and marked the beginning of a new era in American Arachnology. The chief feature of this paper was the series of twenty-four excellently drawn plates. These illustrated the important sexual characters. In two years there followed a paper on the Epeiridae, and later similar articles on the other families, and in 1894 a paper on Canadian spiders. These papers were notable because of the illustrations. Numerous, often beautifully executed, they were particularly valuable because they conveyed at a glance the characteristic appearance of the spider or some portion of it.

James Henry Emerton was born at Salem, Mass., 31 March 1847. He attended the local schools. A helper in his father's drug-store, Mr. Geo. F. Markoe, interested the boy, who was naturally rather frail, in outdoor life. At the age of fifteen he was visiting the Essex Institute, where he became acquainted with A. S. Packard, F. W. Putnam, John Robinson, and Caleb Cooke. At first young Emerton collected insects and other invertebrates, but soon turned his attention almost wholly to spiders, and ever after he was the principal authority on these animals in this country. He was at the Boston Society of Natural History in 1873 and 1874, and in charge of the Salem Museum in 1879.

With a natural aptitude for drawing he soon learned the art and later, became an expert modeler.

As a natural history artist he obtained work at Albany, N. Y., with Prof. A. Hall, later at Madison, Wisconsin, with Prof. A. Winchell, and by 1880 was at Yale University Museum as an assistant. Here he married Mary A. Hills, 25 Dec. 1884, who died in 1898.

Shortly after marriage he moved to Boston, which thereafter was his home. He died on 5 Dec. 1930.

As a young man he travelled extensively in New England, visiting all the states several times and collecting spiders in over one hundred localities. In 1875 he spent nearly a year in Europe. He took with him a collection of over three hundred species of spiders for comparison with European forms, and from Leipzig in Dec. 1875 wrote an article on the results. He visited London, Paris, Berlin, Jena, Leipzig, and Stockholm, meeting Cambridge, Simon, L. Koch, and Thorell.

On his return he continued his New England collecting and later went farther afield. He collected in the Southern States partly with A. P. Morse, sailed with A. Agassiz to the West Indies, visited the Sierras with G. W. Peckham, made several trips to Canada, and in later life to The Pas near Hudson Bay.

As an artist he illustrated, at least in part, Packard's Guide to the Study of Insects, Packard's Monograph of the Geometridae, Scudder's Butterflies of New England, Minot's Textbook of Embryology, Eaton's Fernbook, Peckham's various papers on spiders, some articles for the Fish Commission, and made a host of drawings for A. E. Verrill and others. He made the famous models of the octopus and squid in the Agassiz and other museums, and a greater number of anatomical models for medical schools.

A charter member of the Cambridge Entomological Club, he joined practically all natural history organizations at Boston, including the Appalachian Club, and was active in the meetings of the Botanical, Mycological, Malacological, and Audubon societies, but the organization nearest his heart was the Federation of New England Natural History Societies, which he kept going through many discouragements. He was a fellow of the Entomological Society of America.

His first papers were in the early numbers of "Pysche"; in 1875 he added collecting notes and two plates to the reprint of Hentz's Spiders of the United States. In 1878 he published at Salem "The Structure and Habits of Spiders"; in 1902 "The Common Spiders of the United States", which is a more comprehensive work with many new and beautiful illustrations. From Salem was also published "Life on the Seashore" giving an account of the invertebrates of the New England coast.

His articles on New England Spiders, already mentioned, were followed by several supplemental papers on New England and Canadian spiders. Altogether he described over 350 species of spiders the types of most of which are in the Museum of Comparative Zoology. He became much interested in the distribution of New England and other northern spiders and wrote several papers on the subject. A number of his articles dealt with the habits of spiders and every autumn for many years he faithfully watched for flying spiders.

Aside from being a naturalist he was an artist for the sake of art. He painted many water colors, often based on the sea, the shore, or ships. For several seasons this was done at Ipswich and in later years he went regularly to Gloucester for painting.

To one who knew him for many years, his independent and adventurous spirit, his directness and simplicity, his kindly interest in the scientific work of others, and his continuous endeavors to attract the young to the study of Natural History overtop much of his scientific achievement. NATHAN BANKS.

